CLAIMS

1. An optical apparatus including an airtight chamber for accommodating optical elements, the optical apparatus being characterized by:

a first purge mechanism that supplies a first gas into said airtight chamber;

a second purge mechanism that supplies a second gas having a composition differing from the first gas into said airtight chamber;

an operation condition detecting mechanism that detects an operation condition of said optical apparatus; and

a control apparatus that selectively connects said airtight chamber to said first purge mechanism or said second purge mechanism based on a detection result of the operation condition detecting mechanism.

2. An optical apparatus as claimed in claim 1, further characterized by a light source which emits illumination light.

3. An optical apparatus as claimed in claim 2, characterized in that said light source includes an excimer laser light source which emits excimer laser light.

4. An optical apparatus as claimed in claim 1, further characterized by an illumination optical system having a plurality of optical elements and illuminating a mask with illumination light, wherein at least some of said plurality of optical elements of the illumination optical system are accommodated in said airtight chamber.

5. An optical apparatus as claimed in claim 4,

further characterized by a projection optical system that projects at least part of a pattern formed on said mask onto a substrate.

6. An optical apparatus as claimed in claim 1, characterized in that said first gas is inert gas, and said second gas is oxygen, which has at least the same concentration as that in the atmosphere, or mixed gas, which contains oxygen.

7. An optical apparatus as claimed in claim 6, characterized by a cleaning apparatus arranged in a flow path of the first gas and the second gas to remove impurities from the gases.

8. An optical apparatus as claimed in claim 1, characterized in that said optical apparatus includes a housing which accommodates said airtight chamber, said operation condition detecting mechanism includes an environment monitoring means which detects the concentration of a predetermined gas inside or outside said housing, and said control apparatus switches the purge mechanism connected to said airtight chamber from the first purge mechanism to the second purge mechanism based on the detection results of the environment monitoring means when the concentration of said predetermined gas falls below a predetermined value.

9. An optical apparatus as claimed in claim 1, characterized in that said optical apparatus includes an exhaust apparatus connected to said airtight chamber, said operation condition detecting mechanism includes an exhaust monitoring means that detects the exhaust volume of said

exhaust apparatus, and said control apparatus switches the purge mechanism connected to said airtight chamber from the first purge mechanism to the second purge mechanism based on the detection results of the environment monitoring means when said exhaust volume falls below a predetermined value.

10. An optical apparatus as claimed in claim 1, characterized in that the purge mechanism connected to said airtight chamber is switched from the first purge mechanism to the second purge mechanism when at least one of said operation condition detecting mechanism and said control apparatus is in a deactivated state.

11. An optical apparatus as claimed in claim 1, characterized in that said control apparatus connects said first purge mechanism to said airtight chamber when said optical apparatus operates and connects said second purge mechanism to said airtight chamber when a condition for using said first gas is not satisfied.

12. An optical apparatus as claimed in claim 11, characterized in that said second purge mechanism is connected to the airtight chamber when part of the housing accommodating said airtight chamber is in an opened state, when a power supply of said optical apparatus is off, or when said optical apparatus is being transported, assembled, or adjusted.

13. An optical apparatus as claimed in any one of claims 1-12, further characterized by a holding means that stores and holds said second gas.

14. An exposure apparatus that transfers a pattern of

a mask to a substrate, the exposure apparatus being characterized by:

a light source which emits illumination light;

an airtight chamber accommodating at least some of a plurality of optical elements disposed between said light source and said substrate;

a first purge mechanism that supplies a first gas into said airtight chamber;

a second purge mechanism that supplies a second gas having a composition differing from said first gas into said airtight chamber;

an operation condition detecting mechanism that detects an operation condition of said exposure apparatus; and

a control apparatus that selectively connects said airtight chamber to said first purge mechanism or said second purge mechanism based on a detection result of the operation condition detecting mechanism.

15. An exposure apparatus as claimed in claim 14, characterized in that said airtight chamber includes a first airtight chamber which accommodates the optical elements in said light source, a second airtight chamber which accommodates at least one of the optical elements disposed between said light source and said mask, and a third airtight chamber which accommodates at least one of the optical elements disposed between said mask and said substrate.

16. An exposure apparatus as claimed in claim 14, further characterized by a recovering apparatus that recovers said first gas through at least one of the housing accommodating said airtight chamber and said airtight chamber.

17. An exposure apparatus as claimed in claim 15, characterized in that said second gas is chemically clean dry air.

18. An exposure apparatus as claimed in claim 14, further characterized by a sensor that detects the concentration of either one of said first gas or oxygen in said airtight chamber, and a light emission control apparatus that controls said light source based on an output of said sensor.

19. An exposure apparatus as claimed in claim 18, characterized in that said sensor detects said oxygen concentration, and said light emission control apparatus prohibits the emission of said illumination light from said light source until said oxygen concentration becomes less that or equal to a predetermined value.

20. An exposure apparatus as claimed in claim 19, characterized in that said airtight chamber includes a plurality of airtight chambers disposed in a light path of said illumination light, a plurality of sensors are provided in each of said plurality of airtight chambers, and said light emission control apparatus controls said light source based on outputs of said plurality of sensors.

21. An exposure apparatus as claimed in claim 20, further characterized by an illumination optical system illuminating said mask with said illumination light, a projection optical system projecting at least part of said mask pattern, which is illuminated with said illumination light, onto said substrate, and a transmission system

disposed between said light source and said illumination optical system, wherein said plurality of airtight chambers includes at least one of a first airtight chamber provided in said light source, a second airtight chamber accommodating at least some of optical elements forming said illumination optical system, a third airtight chamber accommodating at least some of optical elements forming said projection optical system, and a fourth airtight chamber accommodating at least some of optical elements forming said transmission system.

22. An exposure apparatus as claimed in claim 20, characterized in that said exposure apparatus includes an illumination optical system which illuminates said mask with said illumination light, and said airtight chamber includes at least two airtight chambers which accommodates the optical elements of the illumination optical system, wherein said at least two airtight chambers are each provided with a sensor.

23. An exposure apparatus as claimed in claim 14, characterized in that said control apparatus connects said airtight chamber to said second purge mechanism in order to supply said second gas into the airtight chamber when the emission of said illumination light from said light source is interrupted or stopped.

24. An exposure apparatus as claimed in claim 23, further characterized by a housing which accommodates said airtight chamber and an exhaust apparatus connected to said housing and operated when said second gas is supplied.

25. An exposure apparatus as claimed in claim 24,

further characterized by an environment sensor that detectes the environment in said housing, wherein said exhaust apparatus is controlled based on an output of said environment sensor.

26. An exposure apparatus as claimed in claim 24 or 25, characterized in that said housing includes either a first chamber which accommodates said light source or a second chamber which accommodates the exposure apparatus main body.

27. A laser light source used in an exposure apparatus that transfers a pattern of a mask onto a substrate, the laser light source being characterized by:

a tank which stores a second gas, which has a composition differing from a first gas that is supplied during the operation of said exposure apparatus; and

piping which introduces said second gas into the laser light source when the laser light source is separated from said exposure apparatus.

28. A gas supply method for supplying a predetermined gas to an airtight chamber, which accommodates optical elements and is disposed in an optical apparatus, the gas supply method being characterized by:

detecting an operation condition of said optical apparatus;

selectively supplying the airtight chamber with a first gas or a second gas, the composition of which differs from the first gas, as said predetermined gas based on the detection result.

29. A gas supply method as claimed in claim 28, characterized in that said first gas is inert gas, and said

second gas is oxygen, which has at least the same concentration as that in the atmosphere, or mixed gas, which contains oxygen.

30. A gas supply method as claimed in claim 29, wherein said optical apparatus includes a housing accommodating said airtight chamber, the gas concentration in the inside or outside of said housing is detected, and, based on the results of the detection, said first gas is supplied to said airtight chamber when said gas concentration exceeds a predetermined value, and said second gas is supplied to the airtight chamber when said gas concentration falls below said predetermined value.

31. A gas supply method as claimed in claim 29, wherein said optical apparatus includes an exhaust apparatus connected to said airtight chamber, the gas supply method being characterized by:

detecting an exhaust volume of said exhaust apparatus; and

supplying said first gas to said airtight chamber when said exhaust volume is greater than or equal to a predetermined value, and supplying said second gas to said airtight chamber when the gas concentration falls below said predetermined value.

32. A gas supply method as claimed in claim 29, characterized in that said first gas is supplied to said airtight chamber when said optical apparatus is operated.

33. A gas supply method as claimed in claim 32, characterized in that said second gas is supplied to said airtight chamber when said airtight chamber or part of a

housing accommodating the airtight chamber is opened or when a power supply of the optical apparatus is off.

34. A gas supply method as claimed in claim 29, characterized in that said optical apparatus includes an illumination optical system which illuminates a mask with illumination light from a light source, a projection optical system which projects at least part of a pattern of the mask illuminated with said illumination light onto a photosensitive substrate, and a transmission system disposed between said light source and said illumination optical system, wherein said airtight chamber is provided in at least one of said illumination optical system, said projection optical system, and said transmission system.

35. An exposure method for projecting a pattern of a mask onto a substrate using a gas supply method described in any one of claims 28-34.

36. An exposure method for projecting a pattern formed on a mask onto a substrate, the exposure method being characterized by supplying said first gas to said airtight chamber using the gas supply method described in claim 32 before projecting said pattern onto said substrate.

37. A device manufacturing method including a step for projecting a pattern formed on a mask onto a substrate, the device manufacturing method characterized by a step of:

supplying said first gas to said airtight chamber using the gas supply method described in claim 32 before projecting said pattern onto said substrate is included.